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Vehicle seat having a massage function
and contour adjustment

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The invention relates to a vehicle seat of a motor vehicle, in particular of a passenger vehicle or a truck, which is equipped with an arrangement for carrying out massage functions. Vehicle seats of motor vehicles have at least one seat cushion and a seat back which are provided with a predetermined seat contour by means of cushion elements and respective spring systems. The construction of vehicle seats of this type conventionally comprises a respective underspringing arrangement which is covered by cushion pads and then by a corresponding seat cover. In this case, it is attempted, by means of the upholstery and the fastening seams of the seat cover, to provide for the driver of the motor vehicle a seat contour which is such that it causes as few symptoms of fatigue as possible, even during prolonged sitting, and is adapted as well as possible to the particular anatomy of the driver. For this purpose, it is known to provide vehicle seats with one or more pneumatic elements which, via a controller and by means of a pressure generator, make it possible for the seat contour to be optimally adapted to a particular driver. A disadvantage of these relatively large pneumatic elements is that the possibilities of influencing the seat contour are also limited because of the respective, relatively thick-walled cushion pads of the backrest and of the seat cushion.

Furthermore, it is known, in the case of vehicle seats, in particular in the case of vehicle seats of trucks, to provide pneumatic elements in the seat, which elements can be pressurized via a control device in such a manner that various massage functions can be realized via the pneumatic element. By this means, in a similar manner to the massage pads of vehicle seats

consisting of beads, a periodically changing seat contour can be produced in such a manner that symptoms of fatigue due to sitting for a long time in the vehicle seat can be prevented in a specific manner. A
5 disadvantage in this case is that either the pneumatic elements only produce a small effect, since they are generally connected to one another pneumatically and therefore in a pressure-related manner, and/or the massage effect is relatively weak, since, in the case
10 of a generation of pressure to a large or less large extent below the cushion pad of vehicle seats and because of the covers that are generally fastened in a fixed position above this cushion pad, an effective transmission of pressures to the body of the driver is
15 avoided.

By contrast, the present invention has the object of providing a vehicle seat with a contour adjustment and a massage function which can be realized in as simple a
20 manner as possible in terms of structure and permits an adjustment of the seat which is as effective and variable as possible with regard to the desired seat contour. This object is achieved by a vehicle seat having the features according to claim 1. Advantageous
25 developments and refinements of the invention are the subject matter of the dependent claims.

The vehicle seat according to the invention has a seat cushion and a seat back which are each provided with a
30 plurality of pressurizable elements for influencing the seat contour, and a controller for the specific pressurization of the elements, it being possible for different massage effects to be obtained by means of the controller. The vehicle seat according to the
35 invention is characterized in that the pressurizable elements are cushion-like elements which are small in relation to the surface of the seat contour and can each be activated separately via lines in order to

change the seat contour in an essentially punctiform manner. This firstly enables an effective massage function to be realized by means of the pressurizable elements, since an essentially punctiform generation of pressure makes changes to the seat contour possible in a specific manner. As a result of the fact that the pressurizable elements are relatively small, cushion-like elements, the required volume is small and the response time is therefore low. The massage function can be fitted on existing seats by means of a small additional amount of space being required. The merely punctiform generation of pressure of individual elements or of a combination of a plurality of pressurizable elements is surprisingly sufficient for a specific change to the seat contour and for an effective realization of massage functions. Although there is merely only a small volume of the pressurizable elements, the point-type increase in pressure within the seatback and the seat of the vehicle makes it possible, owing to and in conjunction with the seat contour, which comprises a lining and/or upholstery and cover, to change the seat contour in a specific and effective manner.

According to one advantageous refinement of the invention, a desired, static seat contour can be set by means of the pressurizable elements and the controller of the vehicle seat. Building on this preset, static seat contour, i.e. a seat contour which is defined by different pressurization of individual pressure elements, then a massage function can advantageously be realized in a simple and effective manner, for example by periodic changing or combined actuation of individual pressure elements or of pressurizable elements of an entire region, such as, for example, the dorsal vertebra region, and the seat contour, which is specifically adapted to a driver, is readily resumed afterwards. Similarly preset seat positions for a

plurality of users, as are occasionally already realized in motor vehicles nowadays, can thus adapt the vehicle seat to different users of the vehicle in a specific manner, i.e. in accordance with the particular
5 orthopedic and/or comfort-related conditions. According to the invention, the seat contour can always be retrieved again or is automatically resumed after one or more massage actions have been carried out. This advantageously takes place by pressurization of
10 individual elements which each have only a small volume and accordingly have short response times. The contour adjustment according to the invention with a combined massage function is less space-consuming and can be fitted in a simple manner between the individual
15 elements of a vehicle seat, in particular the underspringing arrangement, upholstery and the cover of the seat.

According to a further advantageous refinement of the
20 invention, the pressurizable elements are arranged between the upholstery and a cover of the vehicle seat. The effectiveness of the essentially punctiform generation of pressure by means of the pressurizable elements can therefore be further increased. In the
25 present case, essentially punctiform is understood as meaning a region which is relatively small in relation to the overall surface of the seat or of the seatback of the vehicle seat, in particular a region in the order of magnitude of 5 to 10 cm², which is actuatable
30 separately by means of an individual pressurizable element. The number and arrangement of the particular elements is preferably distributed essentially over the entire surface of the seat contour, but may also be limited to individual specific regions.

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According to one advantageous refinement of the invention, the pressurizable elements are fixed on a sheet-like support insert and are arranged below a

lining of the vehicle seat, which lining is covered by the cover of the seat. This facilitates the assembly of the seat according to the invention, since the individual elements and their connecting lines are
5 fixed on a support surface in such a manner that slipping or displacement during the production of the vehicle seat is avoided. The position of the particular pressure elements is therefore precisely established, so that, in particular, even specific massages of
10 individual locations in the region of the seat contour are possible.

According to a further advantageous refinement of the invention, the shape of the pressurizable elements is
15 such that essentially punctiform pressure regions can be produced within the seat contour. This avoids that, by actuation of a single element, the entire region of the seat cushion or of the backrest, or of at least a large part thereof, is likewise moved. The punctiform
20 pressurization has the particular advantage that the variability in the realization of a presetting of the seat contour is also increased as is the diversity of the massage functions which can be realized by means of the seat. A shape of the pressurizable elements which
25 is essentially adapted to a punctiform generation of pressure regions is, for example, an oval or circular shape with lateral boundary seams, so that, when the element is pressurized, essentially only an expansion in the direction transverse to the surface of the seat
30 contour takes place. An alternative example of a shape of a pressure element, so that a punctiform generation of pressure is possible, is the provision of bellows-like side regions which are connected by sheet-like, opposite side walls. Here too, a pressure is generated
35 essentially in the direction of the surface of the seat surface and of the backrest surface without a relevant enlargement of the element toward the sides and therefore a sheet-like - not punctiform - generation of

pressure taking place. Of course, it is alternatively possible for use to be made of any other shape of the pressurizable element, as long as, in accordance with this aspect of the invention, an essentially punctiform
5 pressurization, i.e. pressurization which is specific and effective with regard to the massage action and the setting of desired seat contours, can be realized.

According to another advantageous refinement of the
10 invention, the pressurizable elements can be actuated via respective, separate lines, the lines being arranged and fixed in the surface of a support insert and being brought together in a manner such that they are bunched together in the direction of the control
15 element. This arrangement simplifies the installation of the pressure elements and of their lines during the production of the vehicle seat, since a simple, sheet-like support insert has to be fitted and fixed in the layers of the seat. In addition, the connecting lines
20 of the control device or of the pressure-generating device are thereby as short as possible, and the corresponding response times when pressurized are correspondingly short. The fixing in the surface of a support insert furthermore has the advantage that the
25 amount of space required is reduced to a minimum in its vertical extent.

According to a further advantageous refinement of the invention, the pressurizable elements can be
30 pressurized pneumatically or electropneumatically. As an alternative, a pressurization by a fluid may also be provided, but the use of air is advantageous in respect of leakage problems.

35 According to a further advantageous refinement of the invention, the controller is adapted for carrying out a plurality of preset and individually settable massage functions. The massage functions are realized via a

combined, periodically changing and/or individual actuation of the particular pressure elements in the regions of the seat contour. In particular, this makes it possible to implement known types of massage, such as, for example, a reflex zone massage with specific
5 massage of individual regions of the body.

According to another advantageous refinement of the invention, a plurality of preselected settings of a
10 seat contour can be stored by means of the controller. This makes it possible for a specific adaptation of the seat contour that is essential for prolonged driving to be stored in each case for different users of the vehicle, in particular in the case of trucks. In a
15 manner similar to preset seat positions (seat height, backrest slope, distance from the pedals etc.), the particular seat contour can advantageously also be specifically adapted and also stored in this adaptation. All that the particular driver has to do is
20 select the presetting that has been optimized for his body build, and this is realized by the controller via the pressurizable elements.

Further advantages, advantageous refinements and
25 details of the invention can be gathered from the description below, in which the invention is described and explained in more detail with reference to the exemplary embodiments illustrated in the drawing.

30 In the drawing:

figure 1 shows a schematic oblique plan view of a first exemplary embodiment of a vehicle seat with pneumatic pressure elements according to
35 the invention;

figure 2 shows a schematic, cutaway side view of a vehicle seat of the exemplary embodiment from

figure 1 in the relaxed state of the pressure elements;

5 figure 3 shows the vehicle seat according to figure 2 with two pneumatic elements in the pressure state;

10 figure 4 shows variant embodiments with regard to the shape of the pneumatic elements according to the invention; and

15 figure 5 shows variant embodiments in terms of the detail of the shape and arrangement of the pressure lines for the pneumatic pressure elements according to the invention.

A first exemplary embodiment of a vehicle seat according to the invention with a combined massage function and contour adjustment is illustrated
20 schematically in an oblique view in figure 1. As is known, the vehicle seat 1 has a seat cushion 2 and a backrest 3 which are connected to each other in an articulated manner. The vehicle seat 1 is provided below its cover 8 with a plurality of pressurizable
25 elements or pneumatic elements 4 which can be actuated with air pressure by a pressure-generating device (not shown in the figure) via respective connecting lines 6. The pneumatic elements 4 preferably have a relatively small volume or surface expansion, so that an
30 essentially punctiform generation of pressure is possible. In the exemplary embodiment shown here, the shape of the pneumatic elements 4 is essentially oval or circular, so that small pressure pads or pressure cushions are formed in selected regions of the seat
35 contour of the vehicle seat 1. As an alternative, the entire seat contour may be provided with the pneumatic elements 4 illustrated. The pneumatic elements 4 are fitted and fastened on a sheet-like support insert 9,

so that their respective position within the surface of the seat contour is precisely established. In addition, this facilitates the assembly. The actuation of the pneumatic elements 4 - on their own, in combination or
5 in a consecutive time sequence - takes place via a controller 5 arranged in the region of the seat back 3. Each pneumatic element 4 is provided separately with the required air pressure by means of the controller via respective, separate connecting lines 6. The
10 realization of a massage function just like the realization of specific seat contours can thus be realized in an advantageous and effective manner with a relatively small volume, i.e. a relatively low pressure, in the medium or the compressed air.

15 Figure 2 schematically illustrates a lateral sectional view of the vehicle seat 1 according to the exemplary embodiment of the invention from figure 1. The construction and the structure of the vehicle seat can be gathered therefrom: the construction in each case of
20 the seat cushion 2 and of the seat back 3 of the vehicle seat 1 comprises in particular an underspringing arrangement 11, upholstery 7, a lining 10 and a cover 8 covering these elements. In
25 this exemplary embodiment, the insert according to the invention of pneumatic elements for a massage function and a contour adjustment of the seat is arranged between the upholstery 7 and the lining 10. The relatively small, separate pneumatic elements 4 are
30 arranged in the vicinity of the surface of the seat contour of the vehicle seat 1 in such a manner that, with little pressure and a small volume, an adjustment of particular regions or points of the seat surfaces and backrest surfaces is possible. The controller 5 is
35 preferably arranged in the region of the backrest 3, so that an additional amount of space is not required.

Figure 3 illustrates the exemplary embodiment of a

vehicle seat according to the invention from figure 2 in a similar view, with two selected pneumatic elements 4 being illustrated here in the pressure state. The two pressurized pneumatic elements 4 each
5 produce a local bulge at the predetermined point, essentially without the entire contour of the vehicle seat being changed. That is to say, after the pressurization of the two elements 4, it is ensured that the original seat contour is reached again.
10 Similarly, the situation illustrated in figure 3 may be a preselected, specific seat contour of a specific driver who has a respective elevation in the lumbar vertebrae region and in the front seat surface region, for the optimum orthopedic adaptation or other type of
15 adaptation to the body of this driver.

Figure 4 illustrates variant embodiments in respect of the shape of the pneumatic or pressure elements 4 according to the invention. The common feature of all
20 of the shapes illustrated in figure 4 is that the shape is such that an essentially punctiform pressurization with the pneumatic elements is made possible. In addition, the elements 4 are relatively small in their volume and are also small in respect of their surface
25 expansion with regard to the entire surface of the seat contour. Each pneumatic element 4 is provided with a respective line connection 6 via which the pressure is supplied and can be conducted away again. The shape variants which are illustrated and are given by way of
30 example for the possibility of realizing a punctiform generation of pressure are the following shapes: oval, eye-shape, laterally constricted concertina shape, two-chamber shape, elliptical shape with bump-like bulge and elliptical shape with a plurality of
35 bump-like formations. Of course, other shapes and variants may be suitable for the arrangement according to the invention for the massage and the adjustment of the seat contour of a vehicle seat, as long as an

essentially punctiform generation of pressure which requires little space is possible with them.

Figure 5 shows two variant embodiments of a design and
5 arrangement of respective line connections 6 to the
individual pneumatic pressure elements 4 (not
illustrated). The lines 6 of the first variant
illustrated are cylindrical pipelines which are
arranged and fastened on a support insert 9 and are
10 brought together in a manner such that they are bunched
together in the direction of the controller or
pressure-generating device (not illustrated). The
fixing on the support insert 9 has the advantage of
easier assembly, and the fastening on the surface of
15 the support insert 9 has the advantage of a low amount
of space being required vertically. As an alternative,
in the second variant embodiment illustrated, a
plurality of channel-like, cross-sectionally
rectangular lines 6 are provided on the support insert
20 9 and can be realized, for example, by the welding
together of a plurality of layers of film.

All of the features illustrated in the description, the
following claims and the drawing may be pertinent to
25 the invention both on their own and also in any desired
combination with one another.